037

0 – 2 μF Variable Capacitor

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This circuit makes it possible to simulate a variable capacitance, with the value set by a potentiometer. The amplification stage around IC1b has an adjustable gain, which can be set between +1 and –1 using P1. IC1a is an impedance buffer, which makes the ultimate converted capacitance as close as possible to an ideal capacitance.

This circuit is described by the following formula:

$$U1 = (2\cdot\alpha - 1)\cdot U_{in}$$

in which α represents the setting of P1 (with a range of 0 to 1).

The input current I_{in} is given by:

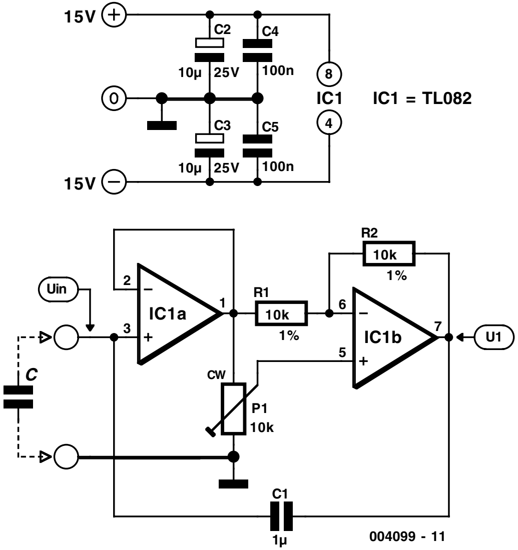
$$I_{in} = \frac{U_{in} - U_1}{\frac{1}{j\cdot\omega\cdot C1}} = \left(U_{in} - (2\cdot\alpha - 1)\cdot U_{in}\right)\cdot j\cdot\omega\cdot C1 = j\cdot\omega\cdot(1-\alpha)\cdot 2\cdot C1\cdot U_{in}$$

The input impedance is thus:

$$Z_{in} = \frac{U_{in}}{I_{in}} = \frac{1}{j\cdot\omega\cdot(1-\alpha)\cdot 2\cdot C1}$$

From the last formula, we can see that the input capacitance is:

$$C_{in} = (1-\alpha)\cdot 2\cdot C1$$



The maximum allowable voltage across C_{in} is 10 V_{pk}. The current consumption of the circuit is around 5 mA.

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